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Pests and parasites

Charles Lester Marlatt

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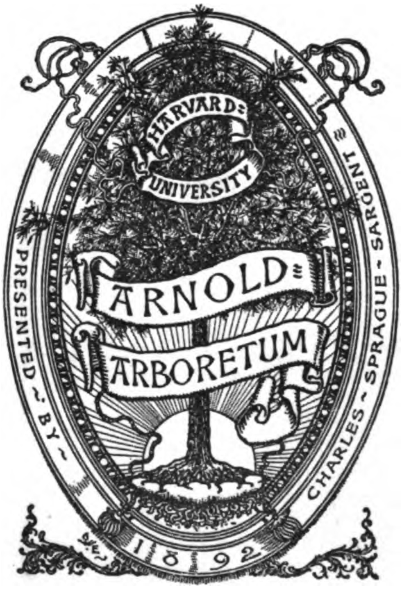

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PESTS AND PARASITES

WHY WE NEED A NATIONAL LAW TO PREVENT THE IMPORTATION OF INSECT-INFESTED AND DISEASED PLANTS

BY

CHARLES LESTER MARLATT
Of the Bureau of Entomology, U. S. Department of Agriculture

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PESTS AND PARASITES

Why We Need a National Law to Prevent the Importation of Insect-Infested and Diseased Plants

By Charles Lester Marlatt

Of the Bureau of Entomology, U. S. Department of Agriculture

With Photographs from the U. S. Department of Agriculture

THE United States is the only great power without protection from the importation of insect-infested or diseased plant stock. Referring to European powers only, Austria-Hungary, France, Germany, Holland, Switzerland, and Turkey prohibit absolutely the entry from the United States of all nursery stock. Our apples and other fruits are admitted only when a most rigid examination shows them to be free from infestation. Most of the other European countries have very strict quarantine and inspection laws, and the same is true of the important English and other colonial possessions.

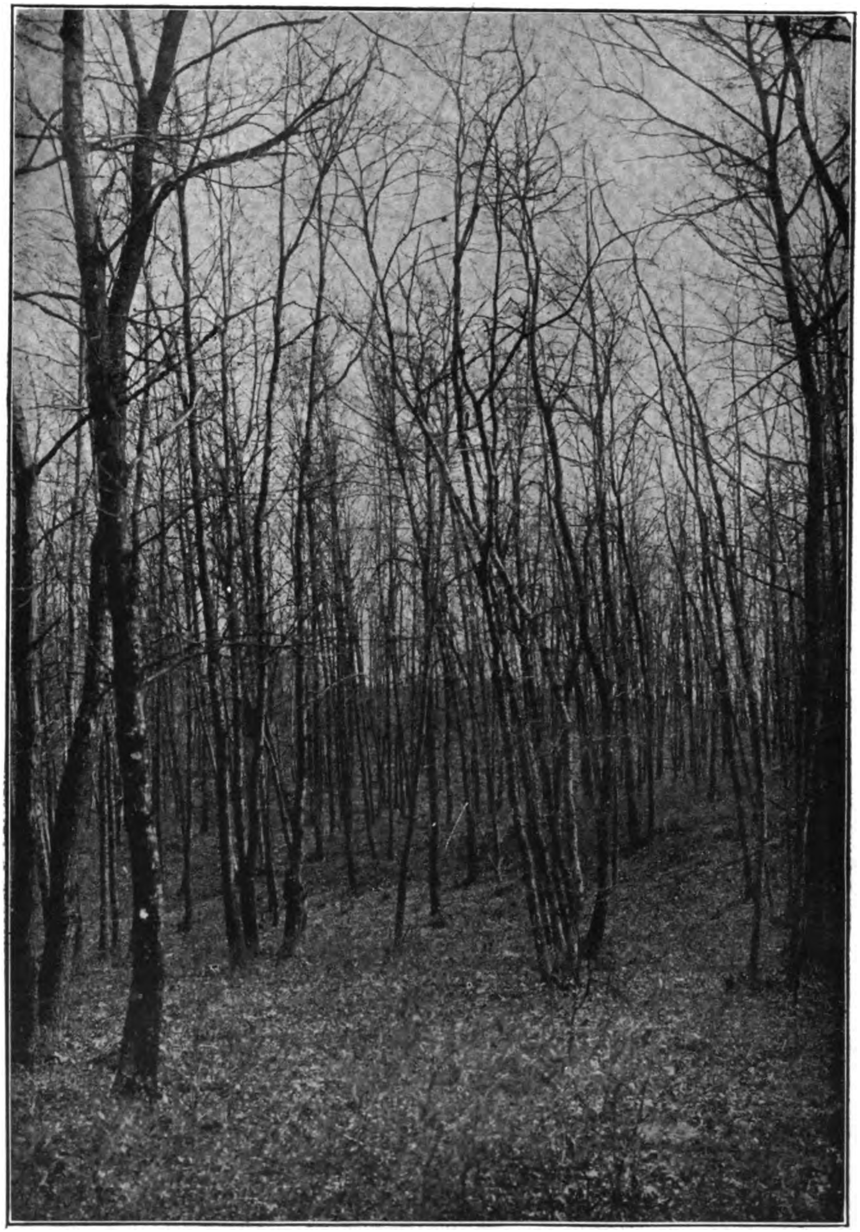
The United States thus becomes a sort of dumping ground for refuse stock. Diseased live-stock may be, and are, excluded by law, but diseased or insect-infested plants have no bar against their introduction.

A properly enforced quarantine inspection law in the past would have excluded many, if not most, of the foreign insect enemies which are now levying an enormous annual tax on the products of the farms and orchards and forests of this country.

FOREIGN ORIGIN OF MANY OF OUR INSECT PESTS

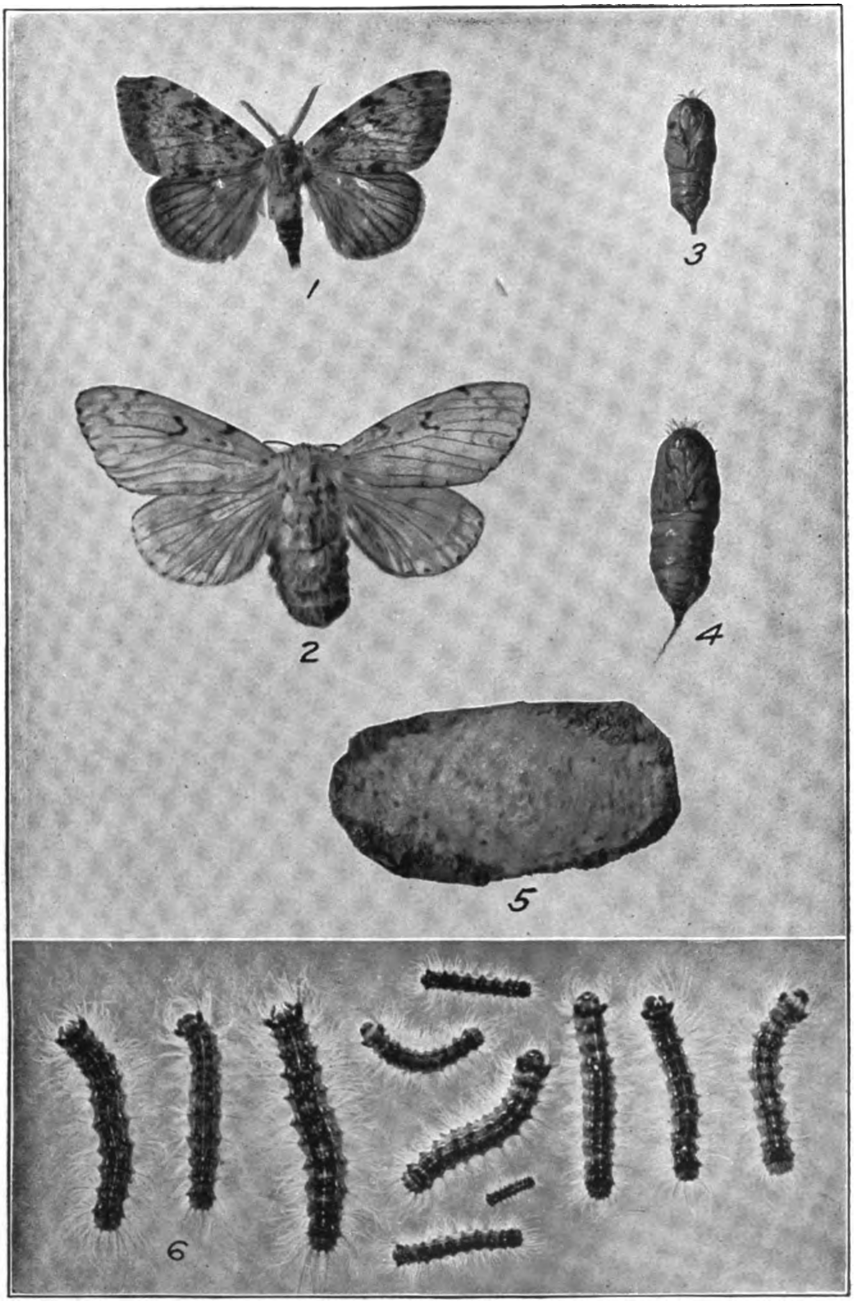
Fully 50 per cent of the important injurious insect pests in this country are of foreign origin. Among these are the codling moth, the Hessian fly, the asparagus beetles, the hop-plant louse, the cabbage worm, the wheat-plant louse, oyster-shell bark louse, pea weevil, the Croton bug, the Angoumois grain moth, the horn fly of cattle, and in comparatively recent years have been introduced such important pests as the cotton-boll weevil, the San José scale, the gypsy and brown-tail moths into New England, the Argentine ant into New Orleans, and the alfalfa-leaf weevil into Utah.

While it is true that certain classes of injurious insect pests, such as the house fly and other household insects which may be similarly carried in ships' cargo or in the packing of merchandise, have been imported, and still will be, in spite of any quarantine law, however rigid, it



TREES THAT HAVE BEEN COMPLETELY STRIPPED OF LEAVES BY THE GYPSY MOTH

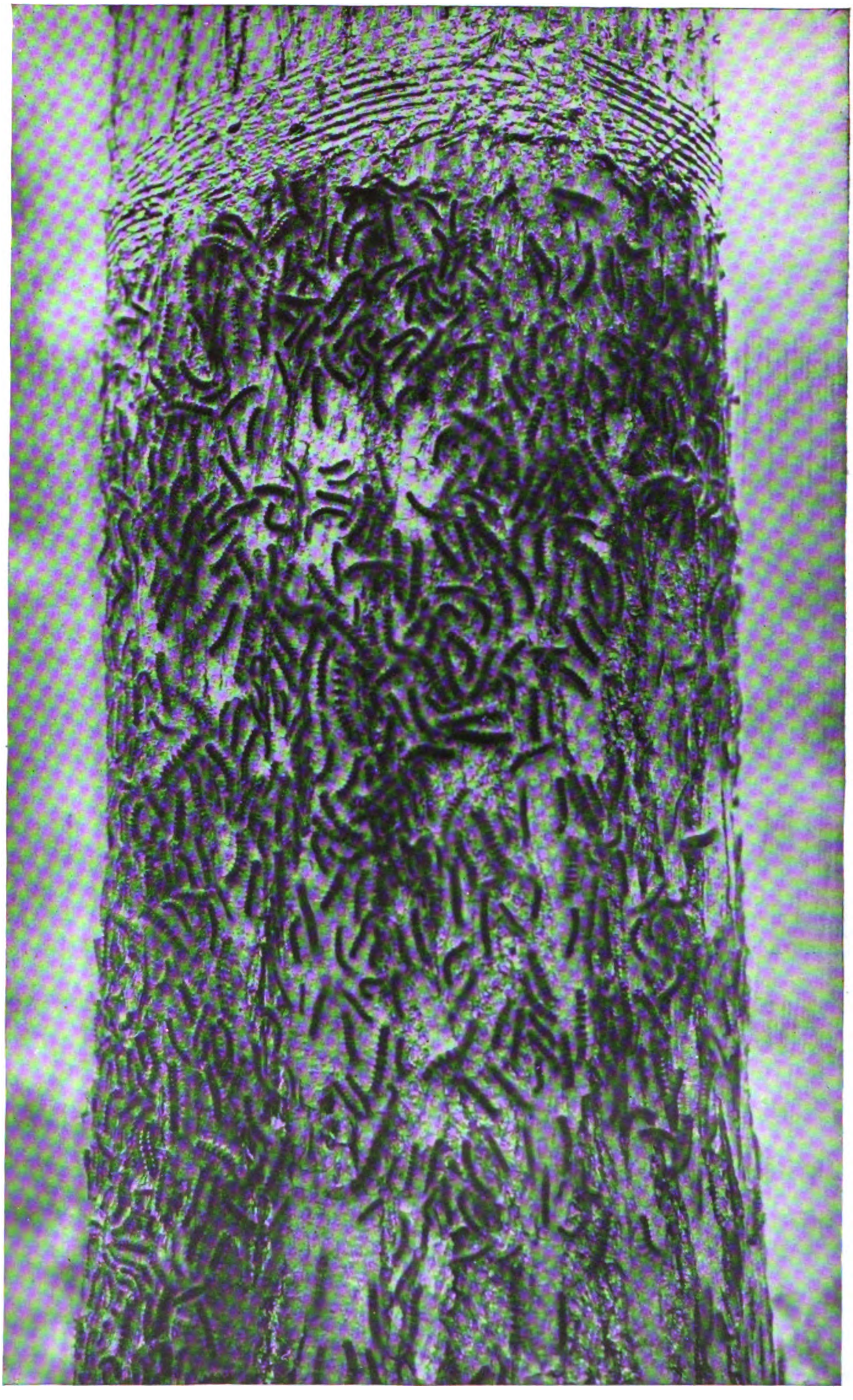
This picture of a woodland at Lexington, Massachusetts, was not taken in midwinter, but in July



THE GYPSY MOTH (*Porthetria dispar*)

Fig. 1. Male moth. Fig. 2. Female moth. Fig 3. Male pupa. Fig. 4. Female pupa. Fig. 5. Egg cluster. Fig. 6. Caterpillars; the largest are less than half grown.

The gypsy moth is one of the worst forest pests of Europe. It was accidentally introduced into Massachusetts 40 years ago, and has now spread to the adjacent States of Connecticut, Rhode Island, New Hampshire, and Maine. It has been recently brought into this country on imported stock and taken to such widely isolated points as Louisiana and Ohio. There is grave risk of its becoming distributed over the entire United States. It has already cost in New England, in mere efforts at control, a good many millions of dollars, and should it become widespread in the United States, damage from it would be beyond calculation. Every effort should be made to prevent a further introduction of this and other equally serious forest pests from Europe and Asia.



GYPSY-MOTH LARVÆ PREVENTED FROM ASCENDING THE TREE BY A BAND OF TANGLEFOOT

This is one of the efficient means of control, and especially for the protection of trees adjacent to infested territory

MASS OF GYPSY-MOTH LARVÆ WHICH HAVE COLLECTED UNDER A BAND OF BURLAP

After the larvæ are half grown they seek for shelter during the day, and will collect under burlap bands in enormous numbers, where they can be readily destroyed

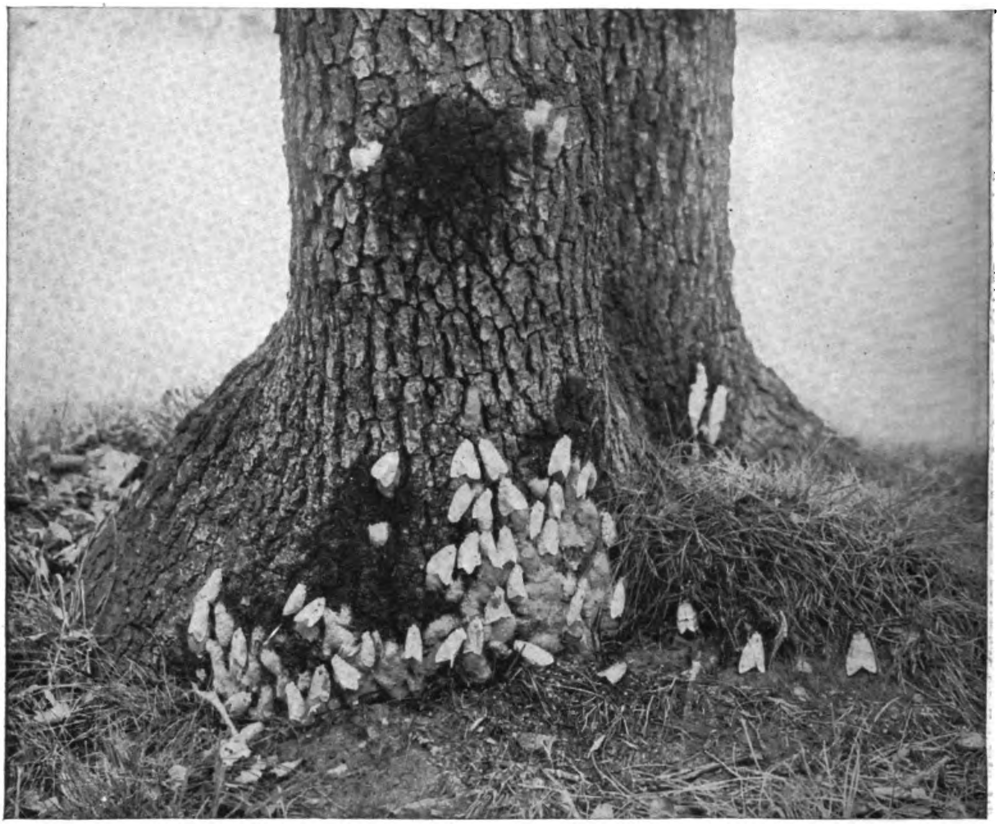
is essentially true that the great mass of the foreign insect enemies of orchards and forests have come in on nursery and ornamental stock, and might have been kept out, in large measure, if an efficient quarantine had been in operation.

THESE IMPORTED INSECTS COST US MANY MILLIONS OF DOLLARS YEARLY

The codling moth, or apple worm, occasions a loss, in cost of spraying trees and injury to fruit, of 16 million dollars a year; the San José scale, similarly in loss of product and cost of treatment of trees, 10 million dollars a year; the Hessian fly, the most important enemy of wheat, probably causes an annual loss of 50 million dollars, and in some years this loss has reached the enormous total of 100 million dollars. The cost to this country of the cotton-boll weevil, from the very conservative estimate of Mr. W. D. Hunter, amounts to about 25 million dollars a year. All these were imported.

The Argentine ant is destroying citrus orchards in Louisiana, and has spread to the orange groves of southern California; the alfalfa-leaf weevil, probably introduced on packing of nursery stock from Europe, has destroyed hundreds of fields of alfalfa in Utah, and is spreading to adjacent States.

The gypsy and brown-tail moths in Massachusetts and portions of other New England States are now costing those States, in expenditures merely in efforts at control, not counting damage at all, upward of a million dollars a year. In addition to this, the national government is appropriating $300,000 a year to aid in controlling these pests along the highways, and by this means check their more rapid distribution. In spite of these



FEMALE GYPSY MOTHS DEPOSITING EGG-MASSES AT THE FOOT OF AN OAK TREE

Each female deposits a mass containing from 400 to 500 eggs. The light oval patches between the moths are such egg-masses

efforts and this enormous expenditure, these insects are slowly spreading, and great damage is done yearly to woodlands, private grounds, and orchards. The dissemination of these two pests over the whole United States, as is extremely likely under present conditions, would entail a like cost throughout the country—a tremendous and unnecessary charge on our fruit and forest interests.

Very careful estimates, based on crop reports and actual insect damage over a series of years, show that the loss due to insect pests of farm products, including fruits and live-stock, now reaches the almost inconceivable total of one billion dollars annually. The larger percentage of this loss is due to imported insect pests, and much of it undoubtedly would have been saved if this country had early enacted proper quarantine and inspection laws.

DANGER OF ADDITIONAL PESTS BEING IMPORTED

Great as is the number of foreign insect pests already imported and established in the United States, there remain many others with equal capacity for harm, which, fortunately, have not yet reached our shores or crossed our borders; or, at most, have infested only a limited part of our domain.

Our increasing business relations with China and other Oriental countries adds enormously to the risk of the importation

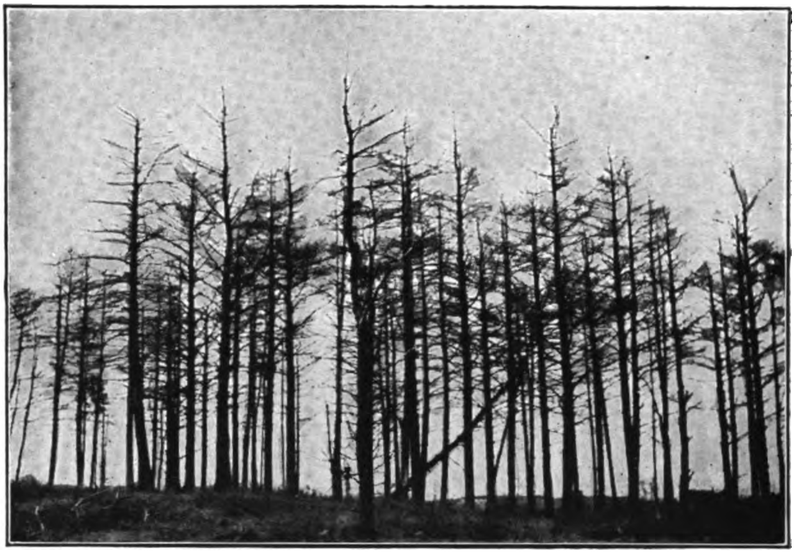
THE DEFORESTED HILL, WITH ITS UGLY FIELD OF STUMPS, SHOWN IN THIS PICTURE, WAS ONCE A BEAUTIFUL PINE GROVE

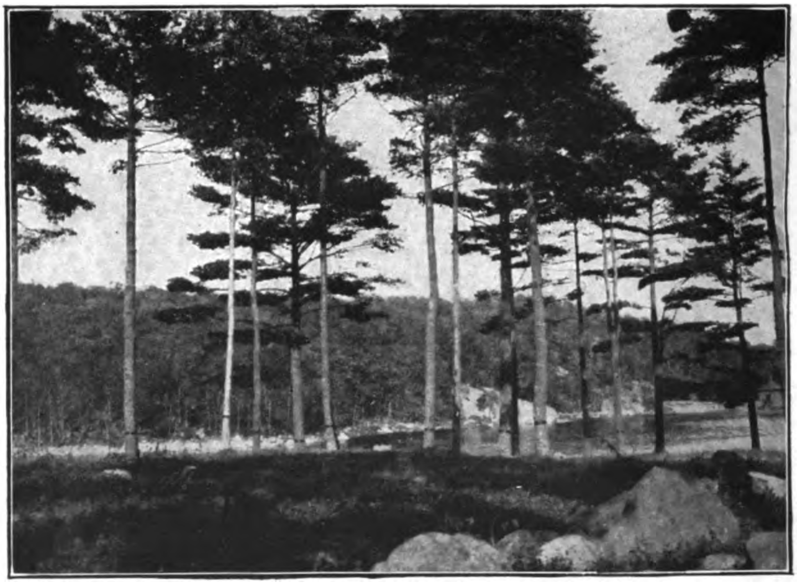
As the gypsy moth had stripped the trees of their foliage, they had to be cut down, because pine trees will not recover from a single stripping of their leaves. Elms, maples, and other deciduous forests will usually stand two or three defoliations.

of new pests. We know very little of the injurious insect pests of those countries, and particularly of China, but the importation of new stock in the last year or two, from China especially, has demonstrated the existence there of many pests which have not hitherto been known. The power of harm of these new pests is abundantly illustrated by the San José scale, which is one of the earliest of the Chinese insect pests to reach us, and undoubtedly came to this country with some ornamental nursery stock sent from north China.

Among the known foreign insect fruit pests which it is very desirable to keep out of this country are the Morellos fruit worm, which is an important enemy of citrus fruits in certain parts of Mexico; the olive-fruit worm, which occurs throughout the Mediterranean countries where the olive is grown; the mango-seed weevil, which has been found in imported mango seed during the present year; several fruit-scale pests known to occur in China, Japan, and other Oriental countries, which have records for harm quite as great as the San José scale; the gypsy and brown-tail moth to regions in this country where they do not now occur, and many other equally dangerous insect enemies of fruit trees, forest trees, and farm crops, known to occur in foreign countries.

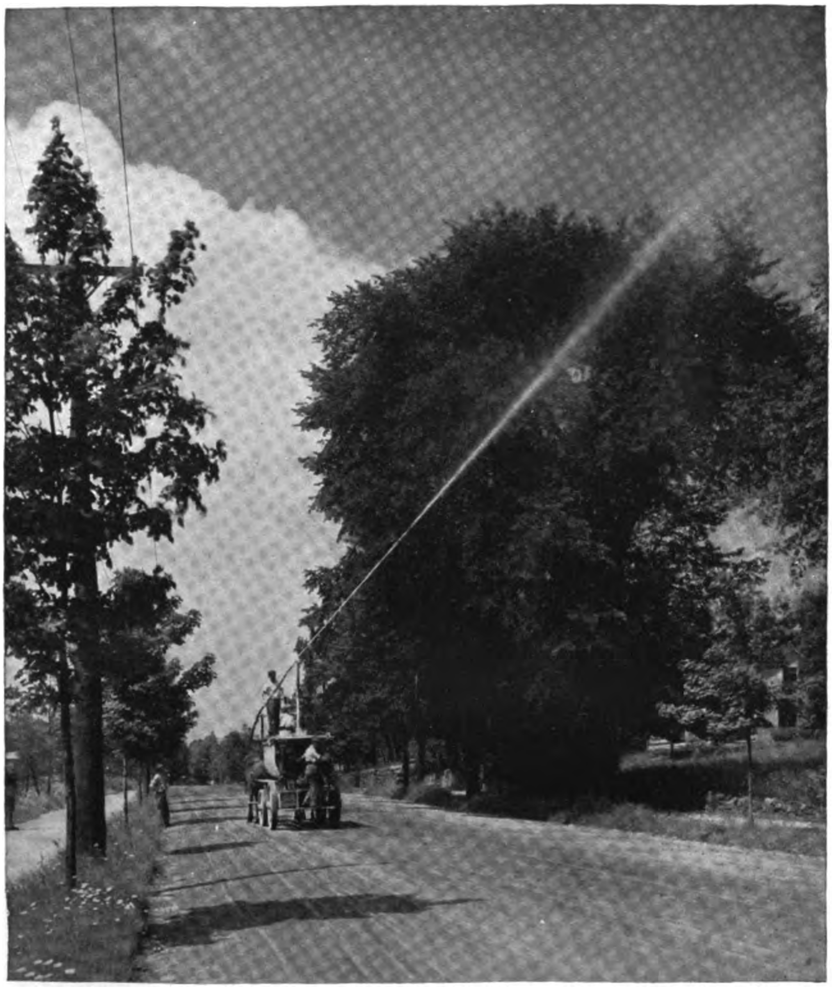
In addition to the danger of importing these insect pests is the risk of bringing in new and dangerous plant diseases. Two illustrations of this danger only will be mentioned, but there are many others equally important. First may be noted a new disease of the potato, known as the "potato wart," which there is grave risk of establishing in this country. This disease, once in the soil, destroys the





PINE GROVE KILLED BY THE GYPSY MOTH (SEE PAGE 339)

PINE TREES THAT HAVE BEEN PROTECTED FROM THE ATTACKS OF THE GYPSY MOTH BY BURLAPPING AND OTHER MEANS

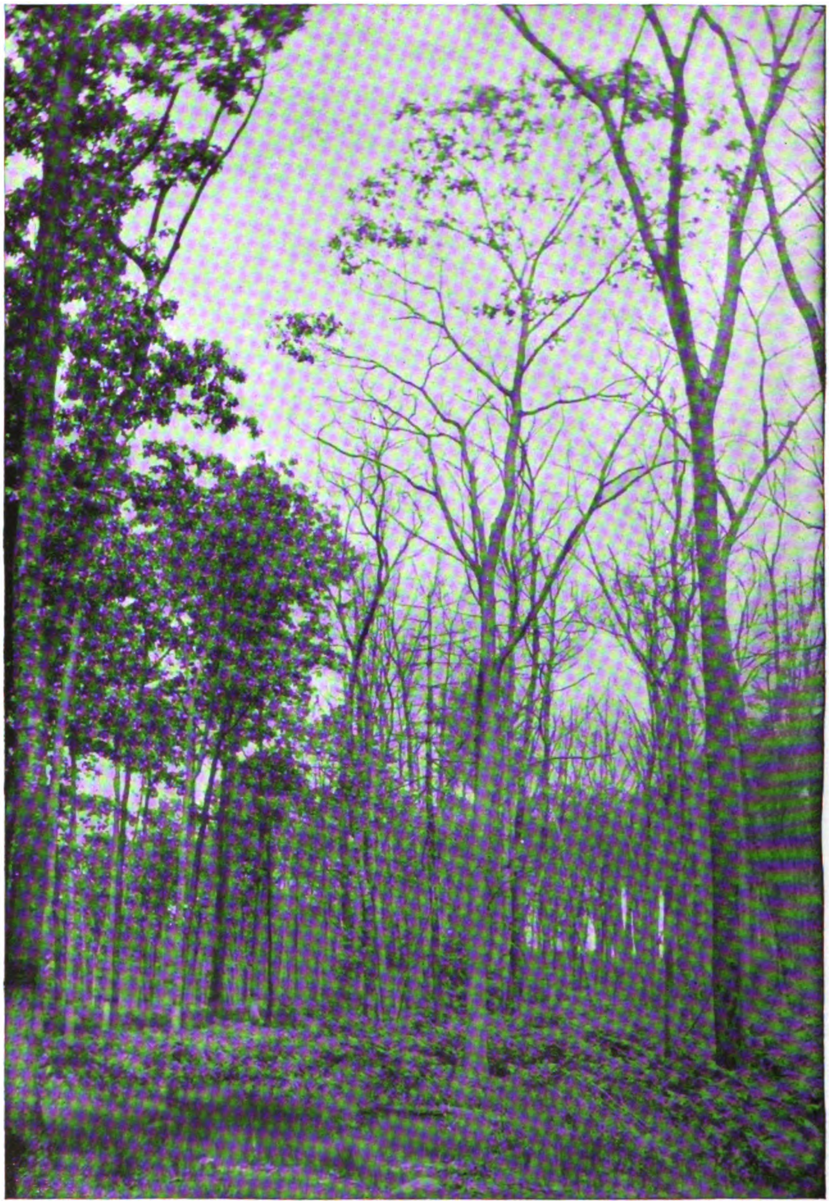


A HIGH-POWER SPRAYING APPARATUS TREATING A MASSACHUSETTS ROADSIDE WITH AN ARSENICAL WASH TO DESTROY GYPSY AND BROWN-TAIL MOTH CATERPILLARS

Note the water tower, by means of which the tops of the tallest trees can be reached with the poison spray. The National Government is spending $300,000 a year in such roadside work in an effort to prevent the rapid spread of the gypsy moth by carriage of caterpillars dropping from roadside trees on vehicles and automobiles, one of the principal means of spread.

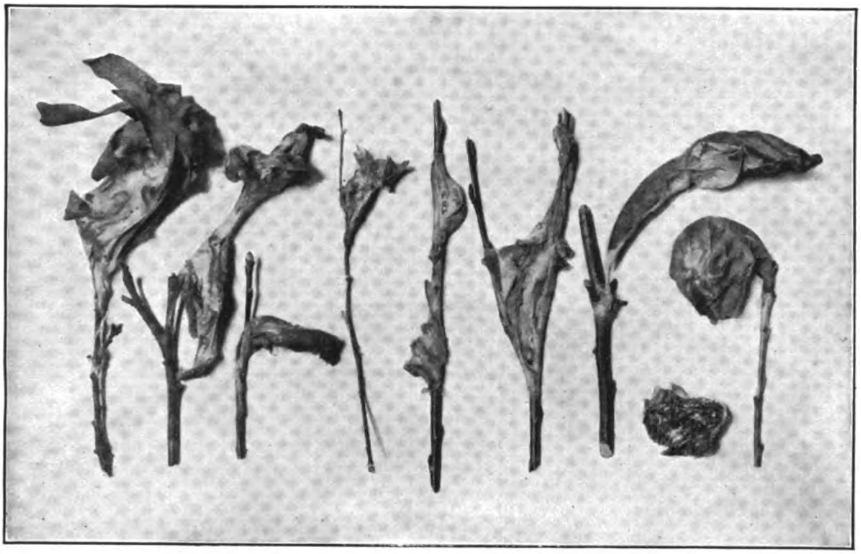
potato tuber and prevents the culture of this staple. The disease was discovered in Hungary in 1886, and has since spread over portions of Europe and into England, where it is causing great alarm. It has also established itself in Newfoundland, and it is especially from this source that the danger to the United States comes. There is no known remedy for the disease, and its existence in the soil practically puts an end to potato culture. Its introduction into the United States would result in the loss of millions of dollars annually.

The other disease is the "white-pine blister-rust," which has caused enormous losses in Europe, particularly to nursery stock. This disease has, during the last



PHOTOGRAPH TAKEN IN AUGUST, 1910, BORDERING A ROADSIDE IN MASSACHUSETTS

The protected trees on the left border the road and have been sprayed; the trees to the right, further from the road, have not been treated, and have been practically stripped of their leaves by gypsy-moth caterpillars.

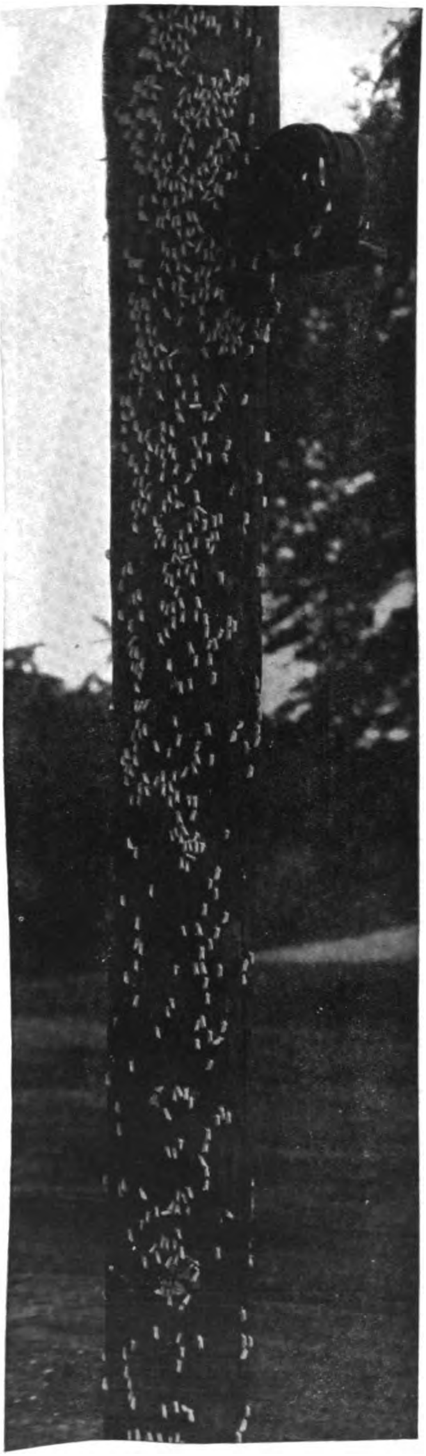


WINTER NESTS OF THE BROWN-TAIL MOTH, CONSISTING OF LEAVES AND WEB ATTACHED TO TWIGS

In these nests from 300 to 400 minute larvæ pass the winter

PILE OF 120,000 WEBS OF THE BROWN-TAIL MOTH GATHERED AND DESTROYED AT YORK, MAINE

York Harbor, Maine, has become thoroughly infested with the brown-tail moth. This illustration is a photograph of a pile containing 120,000 of the winter nests of the brown-tail gathered and destroyed in an effort to free the community from this pest. More than 40 million larvæ were contained in these nests. The brown-tail moth was imported by a Boston florist about 20 years ago on roses from Holland or France. It is a serious enemy of orchard, forest, and shade trees and ornamental shrubbery, and has long been recognized as one of the worst orchard pests of Europe. During the last three years it has been imported in enormous numbers on nursery stock from northern France, Holland, and Belgium, and carried to 22 States. There is no law to prevent such importations. The hairs on the caterpillars produce the brown-tail rash, which often affects residents of infested districts.



BROWN-TAIL MOTHS ON AN ELECTRIC-LIGHT POLE THE MORNING FOLLOWING A FLIGHT*

year or two, been imported on nursery stock into a good many of our States and into the Province of Ontario, Canada. Earnest effort has been made to stamp it out at these points of introduction, and it is hoped that this work has been successful. If this disease becomes established in this country it will result in enormous losses in our pine forests.

Both of these diseases are examples of dangers which can be prevented only by an absolute quarantining of the infested foreign districts, so far as importations therefrom to this country of these particular products are concerned. In other words, these diseases are often not discoverable by inspection, and cannot be destroyed by fumigation. The pine disease may be present in the pine for two or three years before giving any visible demonstration. The potato-tuber disease may be in imported potatoes and similarly escape detection.

EFFORTS TO SECURE LEGISLATION

The necessity for a national quarantine against foreign insect pests and plant diseases has long been recognized, and during the last 14 years, especially, a strong continued effort has been made to secure such legislation. This effort has been blocked very largely by a small body of importing nurserymen, who, careless of the consequences to the country at large, feared some slight check on freedom of their operations. The main body of nurserymen have interests identical with the fruit-growers and are in favor of protective legislation, and *The National Nurseryman,* the principal organ of the nursery trade of this country, has taken positive stand in support of such legislation.

The entire value of the imported nursery stock, as declared at customs, which is thus menacing the safety of this country is about $350,000 annually—scarcely more than the government is now appropriating to assist in the effort at the control of the gypsy moth alone in New England.

Some of this imported stock is of ornamentals neither new nor peculiar, and is merely brought in because of cheaper production abroad. A large percentage of it is seedling apple, pear,

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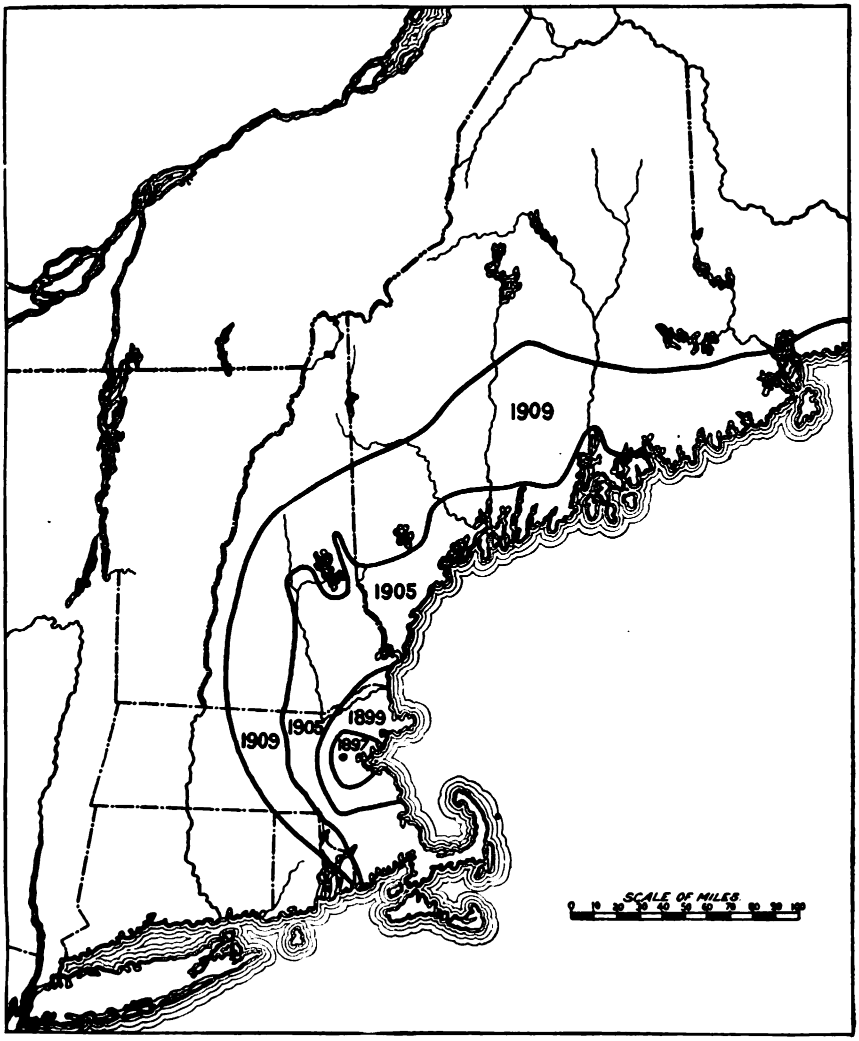
* These moths emerge early in July, are strong fliers, and have spread from the original point of infestation near Boston, northward and eastward, over much of New England. Fortunately the prevailing winds are to the northeast during this season, and their spread to the south and west has been comparatively limited.

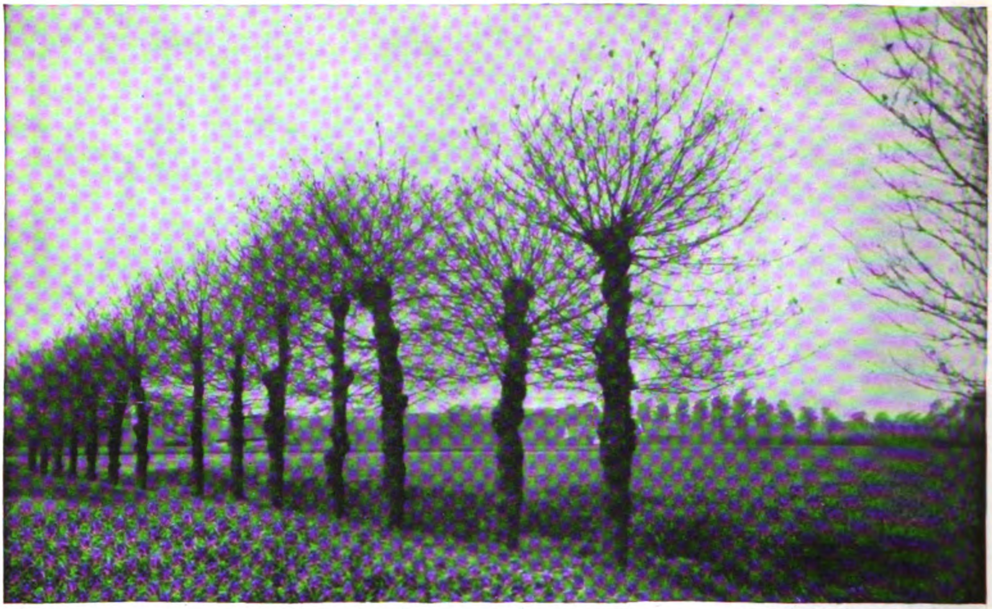


MAP OF NEW ENGLAND, SHOWING AREAS INFESTED BY THE BROWN-TAIL MOTH

This map shows the progressive spread of the brown-tail moth. The prevailing winds during the summer flight in July have carried the insect eastward and northward much faster than southward and westward. This is the insect which is now being introduced on imported nursery stock, and if it gains a foothold in a few interior points its means of rapid spread would enable it to quickly infest the whole country.

cherry, plum, and quince stock. It is held by importing nurserymen that particularly the cherry, plum, and quince stock is better grown abroad than at home. Nevertheless, until recently all such stock was home-grown, and probably the bulk of the apple-seedling stock is still home-grown. Admitting the necessity of the importation of some seedling stock, it is all the more desirable to have means to thoroughly inspect, and, if necessary, quarantine such stock.

The first concerted effort to obtain a national quarantine and inspection law

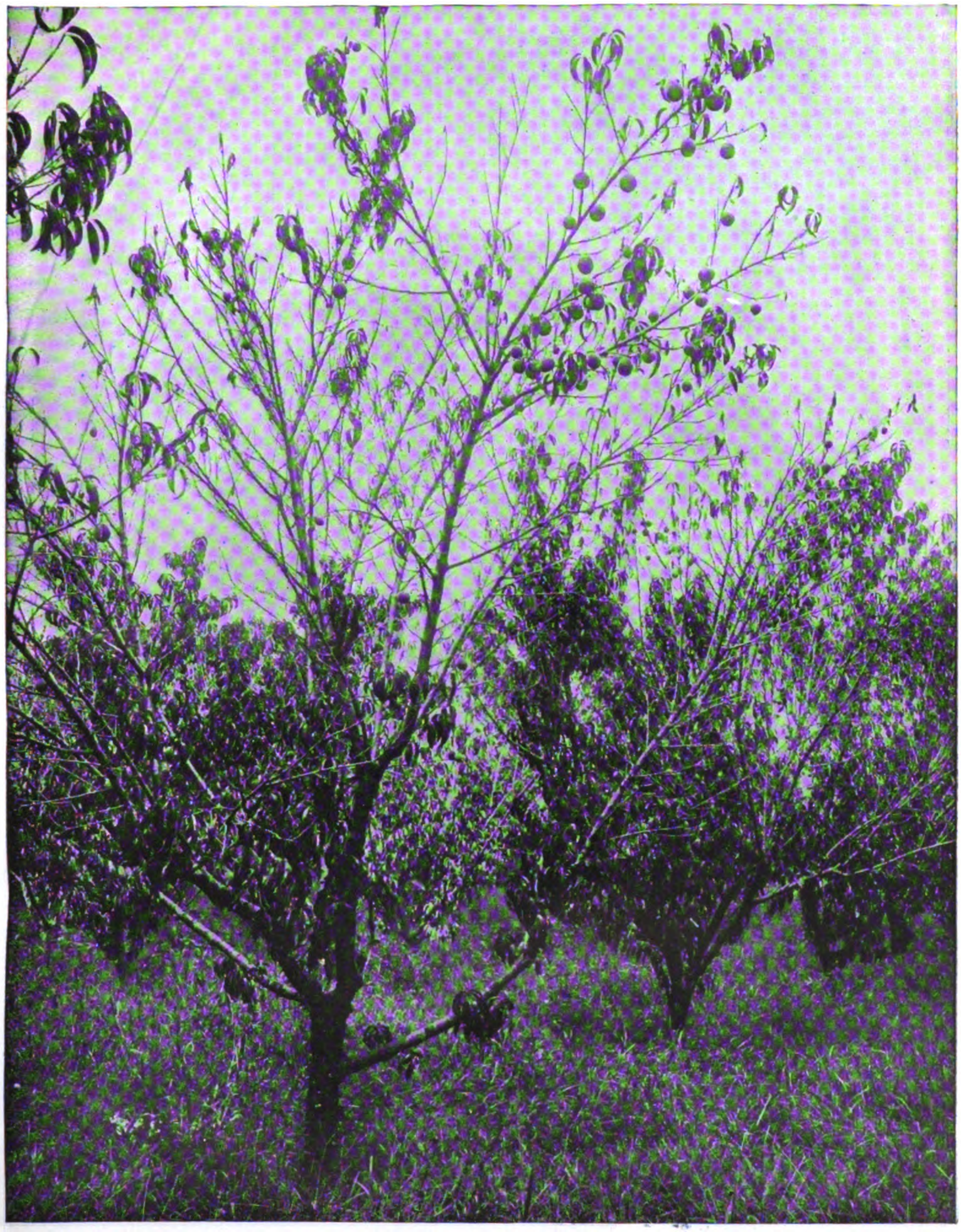


A HEDGE-ROW IN BELGIUM HEAVILY INFESTED WITH WINTER NESTS OF THE BROWN-TAIL MOTH, THE SMALL BLACK DOTS SEEN ON THE BRANCHES

This is a common condition of hedge rows and trees in Belgium. This photograph was taken within a few miles of the Holland border and within easy flight of the moths to certain large Dutch nurseries, which send immense quantities of stock to this country.

WINTER (1910) NESTS OF THE BROWN-TAIL MOTH IN AN INFESTED DISTRICT OF MASSACHUSETTS

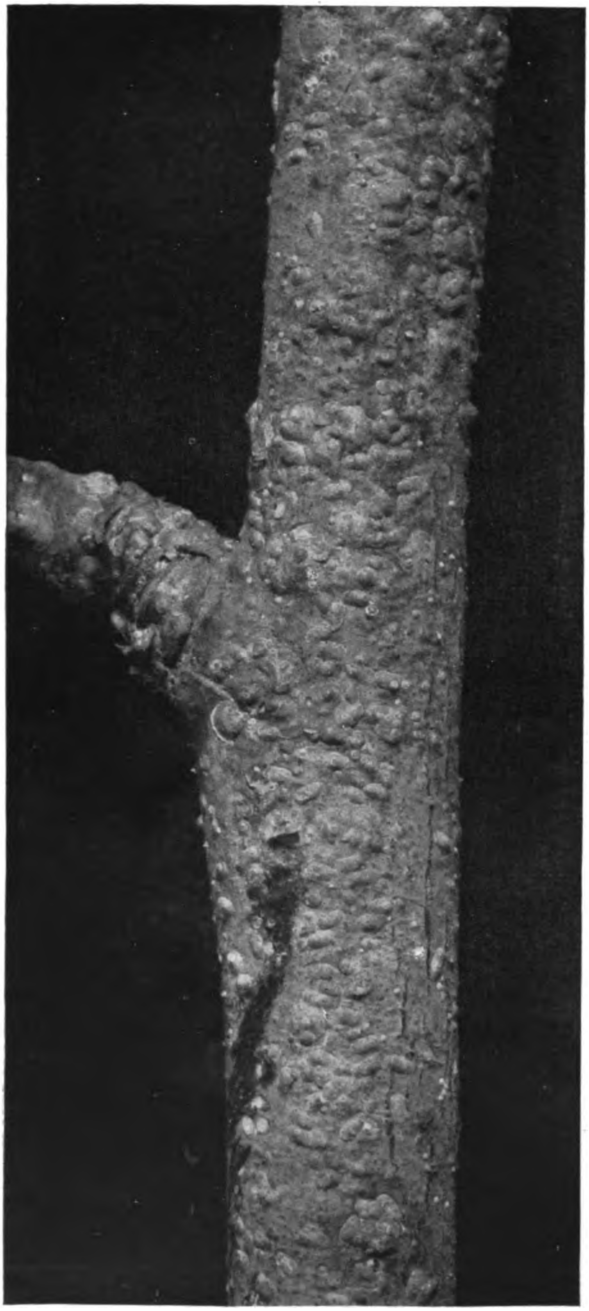
These are easily recognizable objects and must be pruned off during winter and burned



THE EARLY STAGES OF THE SAN JOSÉ SCALE AT WORK IN A PEACH ORCHARD

Trees in full fruit dying. Peach, apple, and other trees are very quickly killed by this scale insect. The San José scale is probably the worst orchard pest that has ever come to America. It was evidently brought with ornamental stock from north China, its native home. It has already caused a loss of more than 50 million dollars, and more than 5 million dollars a year are now being spent for spraying trees to control it. This is an annual tax which does not include the damage to the trees and fruit, much exceeding the cost of spraying.

was due to the introduction in the East on nursery stock of the San José scale in the early 90's. The failure to reach an agreement as to suitable legislation among the nurserymen, fruit-growers, and entomologists prevented anything coming from this effort, although several bills were introduced in Congress from time to time. In the meanwhile the San José scale became so widely distributed by transportation on infested nursery stock that quarantine against this insect was no longer practicable, and the country is now being taxed, and probably will be for all time, many millions of dollars annually in consequence of the absence of any law under which strong hold could have been taken of this danger at the outset.



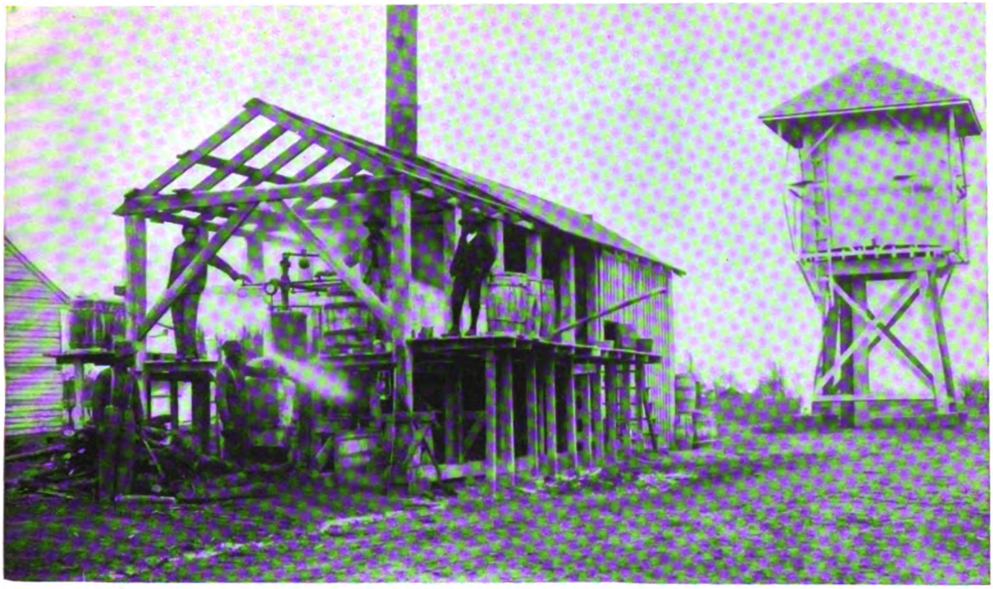
THE SAN JOSÉ SCALE AS IT APPEARS ON THE BARK

The small white dots are the young scale insects, and the larger shell-like objects are the full-grown scales. The insect lies beneath this shell-like covering, and is thus protected from parasitic enemies and from any except strong-killing washes.

CRIMINAL CARELESSNESS

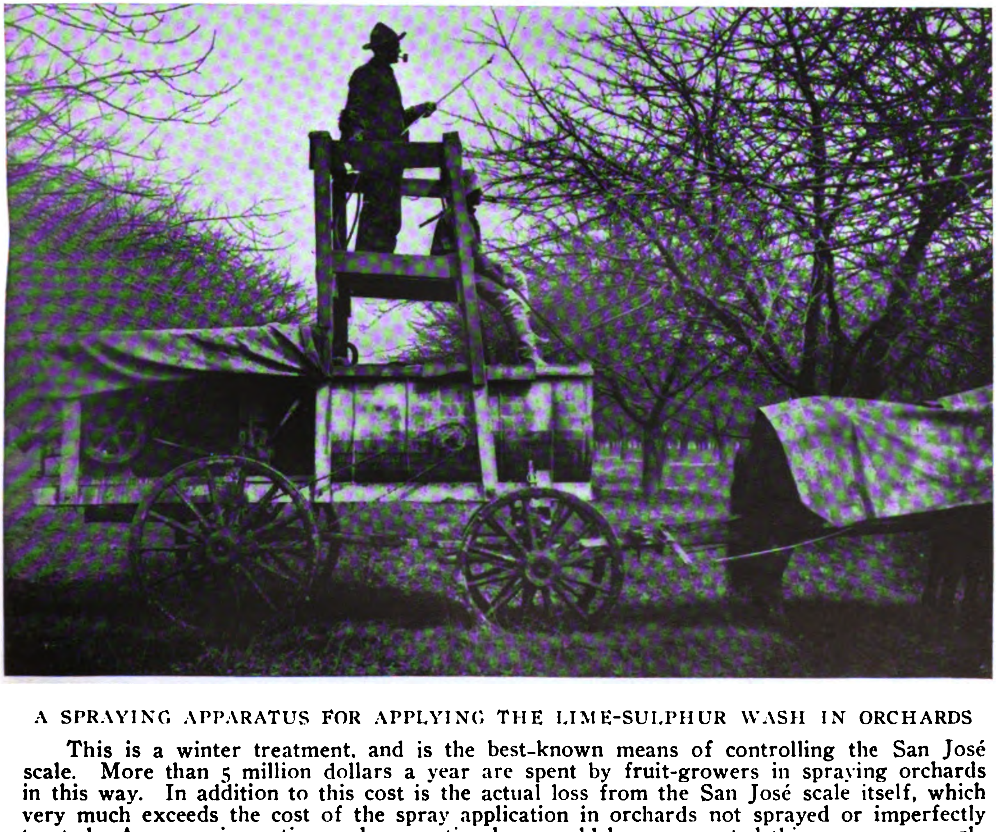
The present effort to secure legislation resulted from the discovery two years ago of the introduction of enormous quantities of brown-tail moth nests, full of hibernating larvæ, on seedling fruit stock, chiefly from northern France. With these were occasional egg-masses of the gypsy moth. During the years 1909 and 1910 such infested stock was sent to no less than 22 different States, covering the country from the Atlantic seaboard to the Rocky Mountains. During the first of these years no less than 7,000 winter nests of the brown-tail moth, containing approximately 2,800,000 larvæ, were found in shipments to New York State alone—seed material enough to infest the whole United States within a few years.

So far as possible, this stock sent to the different States has been examined and the brown-tail moth nests removed and de-



A PLANT FOR PREPARING LIME-SULPHUR WASH

This wash is prepared by cooking a lime and sulphur mixture with steam. The mixture is applied to trees in late winter, and is the best remedy so far found for the San José scale. All the large commercial orchards have their own plants for preparing this wash, which must be applied yearly to save the trees and fruit crop.

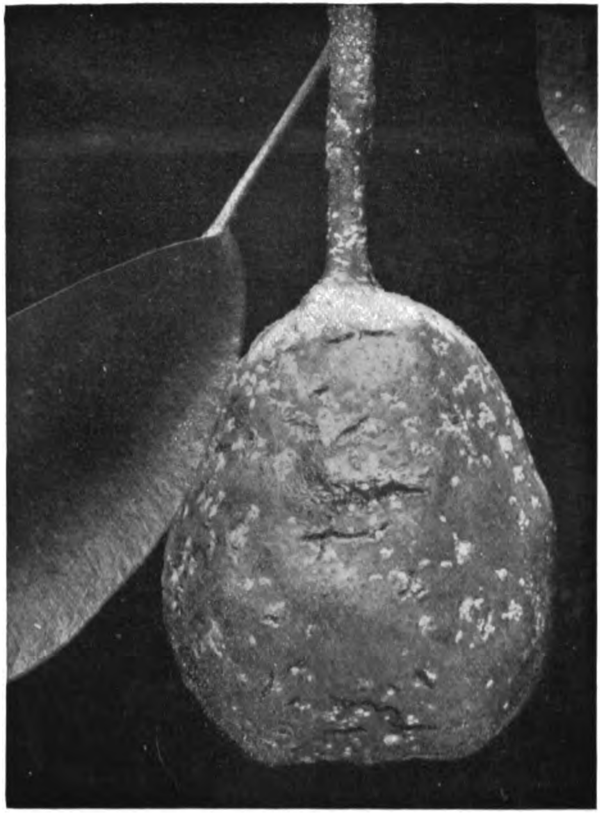


A SPRAYING APPARATUS FOR APPLYING THE LIME-SULPHUR WASH IN ORCHARDS

This is a winter treatment, and is the best-known means of controlling the San José scale. More than 5 million dollars a year are spent by fruit-growers in spraying orchards in this way. In addition to this cost is the actual loss from the San José scale itself, which very much exceeds the cost of the spray application in orchards not sprayed or imperfectly treated. A proper inspection and quarantine law would have prevented this enormous yearly loss.

CUTTING BACK AN APPLE TREE INFESTED WITH THE SAN JOSÉ SCALE PRELIMINARY TO SPRAYING

The cost of this work is very heavy in labor, and it means a loss of fruit for several years, as well as serious permanent injury to the tree



A PEAR INFESTED WITH THE SAN JOSÉ SCALE

The scale insect in sucking juices from the fruit or bark poisons the plant and causes a deformation of the fruit, as well as the killing of leaves and twigs, and ultimately the tree itself.

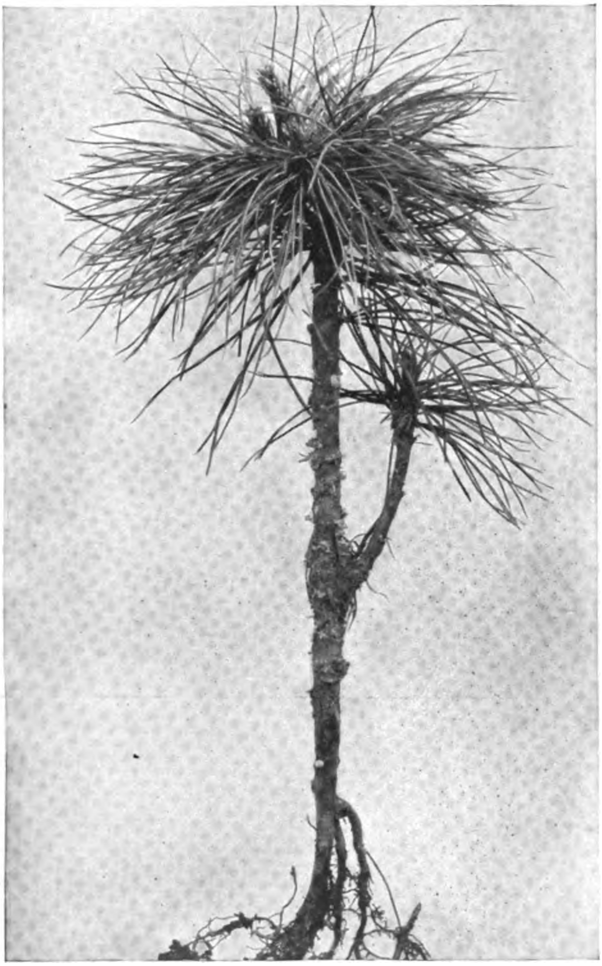
stroyed by State authorities; or, where these were not available, by the agents of the Bureau of Entomology of the United States Department of Agriculture. It is by no means certain, however, that all of the infested shipments have been located and freed.

It is scarcely necessary to comment on the tremendous danger to this country from the careless introduction and wide distribution of the brown-tail and gypsy moths with nursery stock. The cost of these insects in the New England States has already been referred to. The tax from these pests, should they gain a foothold throughout the country, is almost beyond estimate.

In addition to their great destructiveness to orchards and forests, the establishment of the brown-tail or gypsy moths in any suburban residential district means an enormous depreciation in property values, as is well illustrated about the city of Boston, and very notably lessens the attractiveness of coast or mountain summer-resort districts. The north-shore towns of Massachusetts and lower Maine resorts have already felt this influence, and for such regions as the Catskills or Adirondacks the establishment of these pests would mean an end of their more pleasing features. Control over such extended forested mountains would be a practical impossibility, and few would care to live amongst defoliated and caterpillar-infested trees, with the additional risk of dangerous and lasting poisoning from contact with the hairs or molted skins of the brown-tail moth.

THE BROWN-TAIL RASH

In addition to the great monetary loss, the brown-tail moth exercises a very deleterious effect on health. The hairs which cover the caterpillars of this moth are strongly nettling, and not only are they so from accidental contact with a caterpillar which may fall on clothes,



A SEEDLING PINE

The white-pine blister rust, one of the most dangerous diseases of pine trees in Europe, is probably not yet established in America. Seedling pines affected by this disease are now being imported in enormous numbers. It was necessary to burn an entire shipment of 25,000 trees recently received in New York State. In its early stages this disease shows no outward sign, and hence can be excluded from this country only by prohibiting the importation of seedling pines from districts in Europe known to be infested. Its establishment in America would mean a tremendous loss to pine forests. The illustration is one of the diseased pine seedlings. The excrescences on the stem are the postules of the fungus.

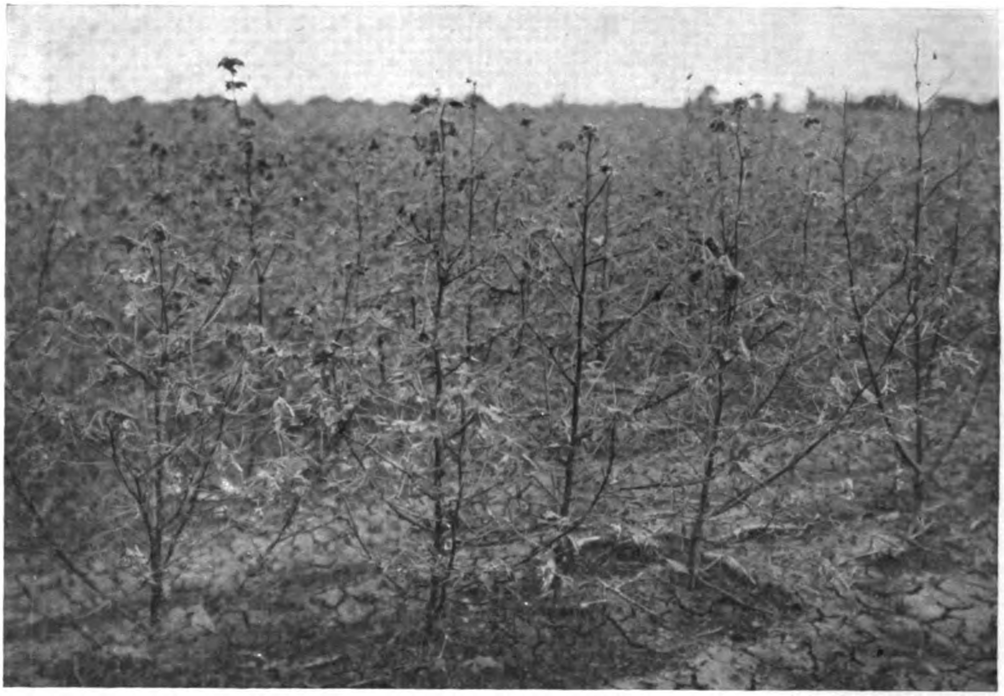


ILLUSTRATION SHOWING A COTTON FIELD PLANTED LATE AND YIELDING NOTHING, BECAUSE OF THE RAVAGES OF THE BOLL WEEVIL

The cotton-boll weevil, an immigrant from Mexico, first invaded Texas and is now extending eastward as far as Louisiana and Mississippi. It causes a loss of cotton to the value of more than 20 million dollars every year. The plants are healthy, but have no bolls or cotton; the weevil has taken it all. The field shown in the illustration on the next page contains a normal cotton crop ready for harvest. This field has been protected from the boll weevil by methods determined by the work of the Bureau of Entomology, U. S. Department of Agriculture.

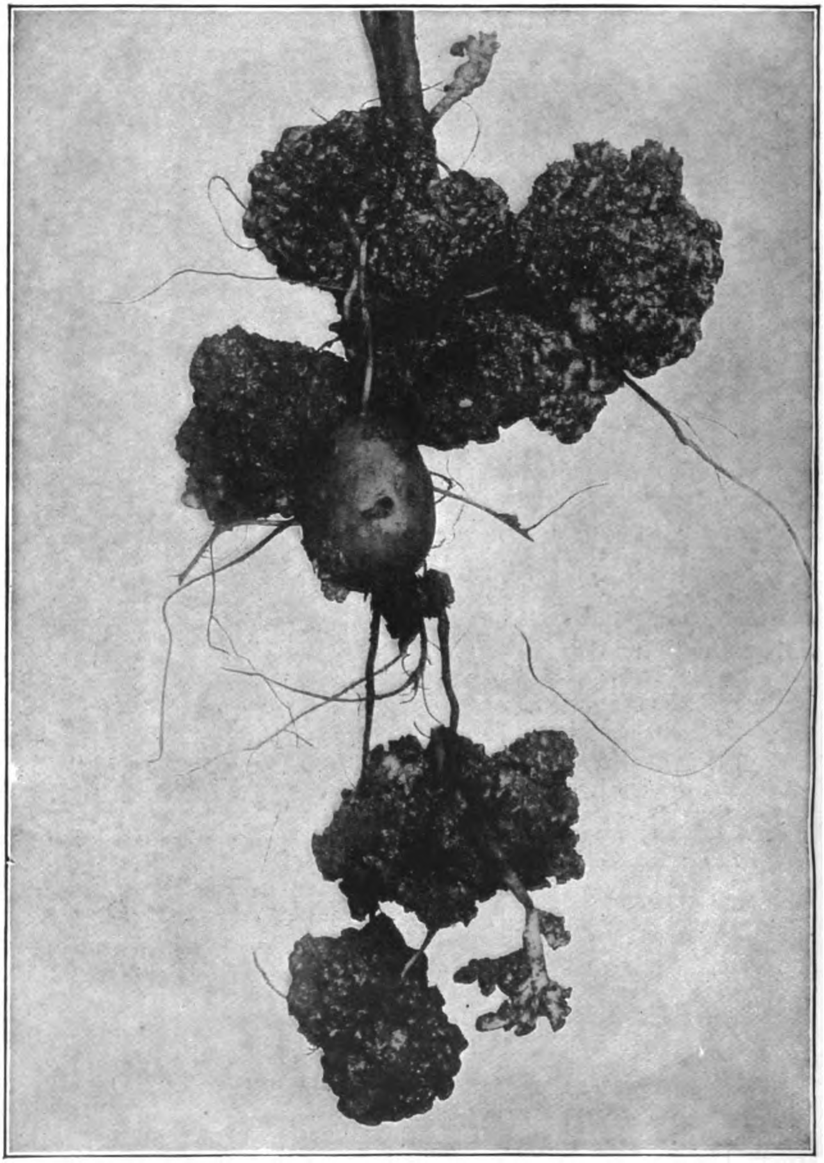
face, neck, or hands from an infested tree, but also from the myriads of hairs which are shed by these caterpillars when they transform to the chrysalis state. The hairs are carried about by winds and find lodgment on clothing, or collect on one's face, neck, or hands, and frequently cause very disagreeable and extensive nettling, the effect of which may last for months. Breathed into the lungs, they may cause inflammation and become productive of tuberculosis.

The brown-tail rash is well known throughout the regions infested in New England, and thousands have suffered from it. All of the assistants who have been connected with the government work in the New England States with these pests have been seriously poisoned, and two of them have had to give up their work and go to the Southwest to attempt to recover from the pulmonary troubles superinduced by the irritating hairs of the brown-tail moth.

This insect is therefore a most undesirable neighbor, even if it were not responsible for great injury to orchards and ornamental trees. When it is realized that the brown-tail moth has already been distributed on imported nursery stock throughout 22 States during the last two years, the danger to the whole country is sufficiently apparent.

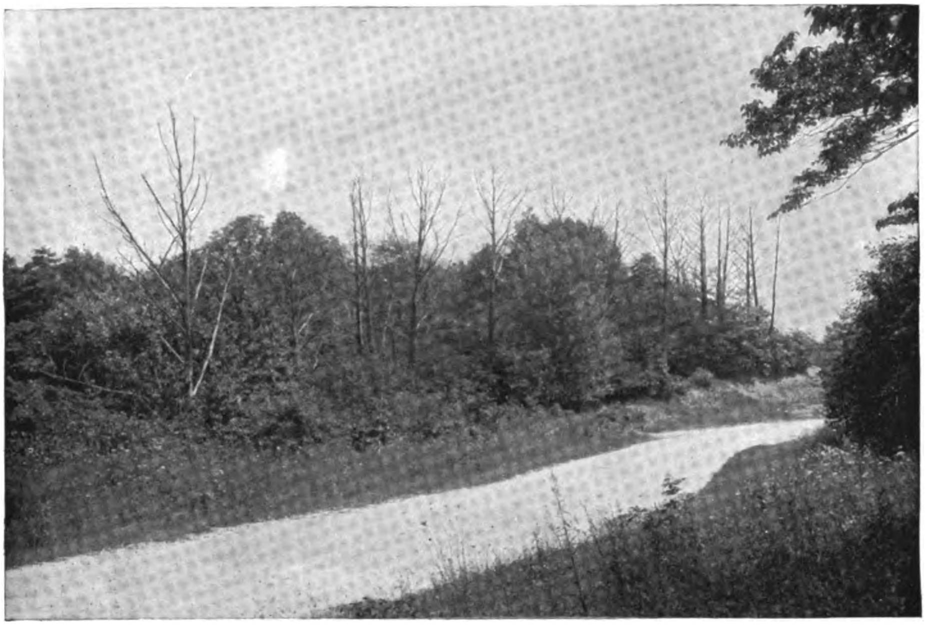
In view of this special danger—which after all is only a continuation of the dangers and experiences to which this

This illustration shows a field on the opposite side of turn-row on the same plantation as in preceding picture, planted and treated in accordance with directions of Bureau of Entomology and yielding three-quarters bale per acre



POTATO PLANT ATTACKED BY WART DISEASE

This disease has stopped potato culture in Europe wherever it has appeared, and is now established in Newfoundland, and diseased potatoes are now coming into the United States, threatening to establish the disease here. This disease, once in the soil, stops potato culture. Its introduction into the United States would mean a loss of millions of dollars annually.



A VIEW IN FOREST PARK, BROOKLYN

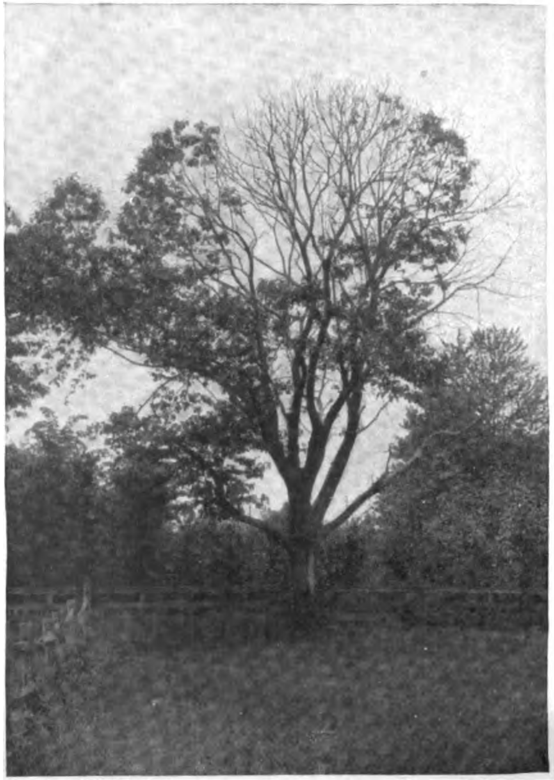
Seventeen thousand chestnut trees have been killed in this park by the chestnut-bark disease, despite every effort made to save them. Photo by Haven Metcalf

country has been long subjected—a new bill was drafted and submitted to Congress for action, the passage of which would give this country great protection. It is a compromise measure—compromise in the sense that efforts have been made to meet the objections of these importing nurserymen. Its enactment will undoubtedly give this country great protection, but not absolute protection, for the simple reason that no inspection or disinfection can be guaranteed to be perfect in its results; and, in addition, there is always the risk of carelessness or venality on the part of inspectors. The bill provides for the introduction of foreign plants by permit only, for the inspection and disinfection of such stock at point of destination in this country, and, in case of need, the quarantining of foreign districts which may contain pests or diseases not possible to be excluded by inspection and disinfection.

Absolute prohibition of entry of nursery stock, except for the introduction of plants new to the United States, through the agency of the United States Department of Agriculture, is the only perfect means of preventing ultimate entrance of dangerous insects, and this is the course which has been adopted, as already indicated, by most of the foreign powers in relation to their own territory. The danger and amount of damage possible from these new pests justify the recommendation of such prohibition, especially in view of the small value of imported nursery stock in comparison with the risk and the fact that most of it at least can be just as well produced at home as abroad.

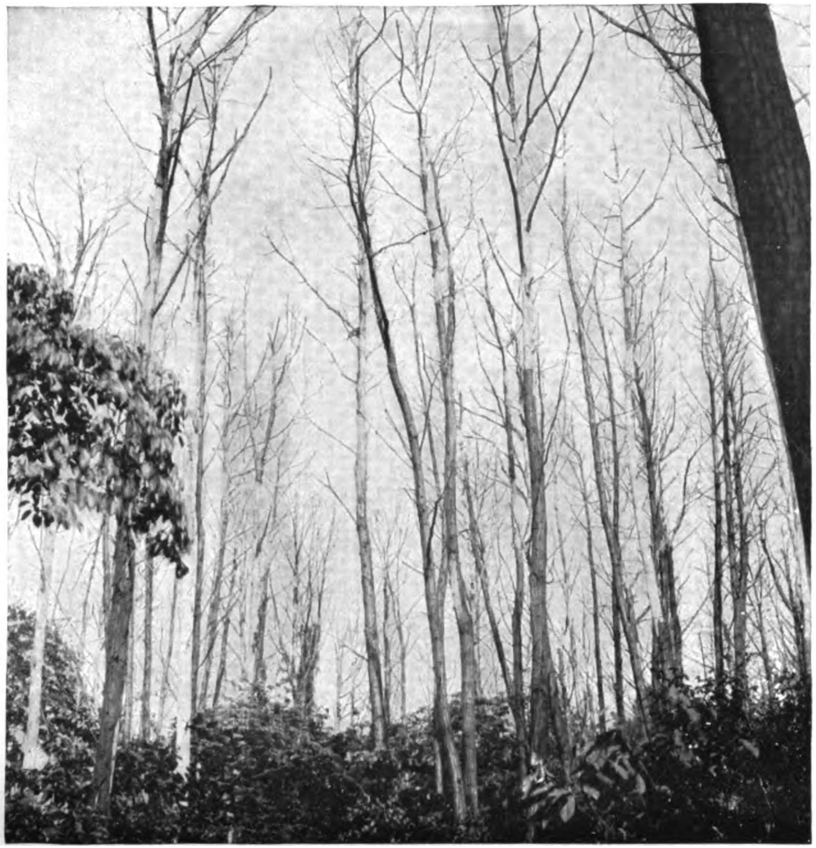
The State of California for the last 20 years has enforced a quarantine at the port of San Francisco, which is the only port in this country so guarded. During these 20 years a great many dangerous insects and diseases have been detected and stopped at this port, to the enormous gain of the fruit interests of California, and, indirectly, of the whole country.

Some of our more recently developed fruit districts in the great Northwest and



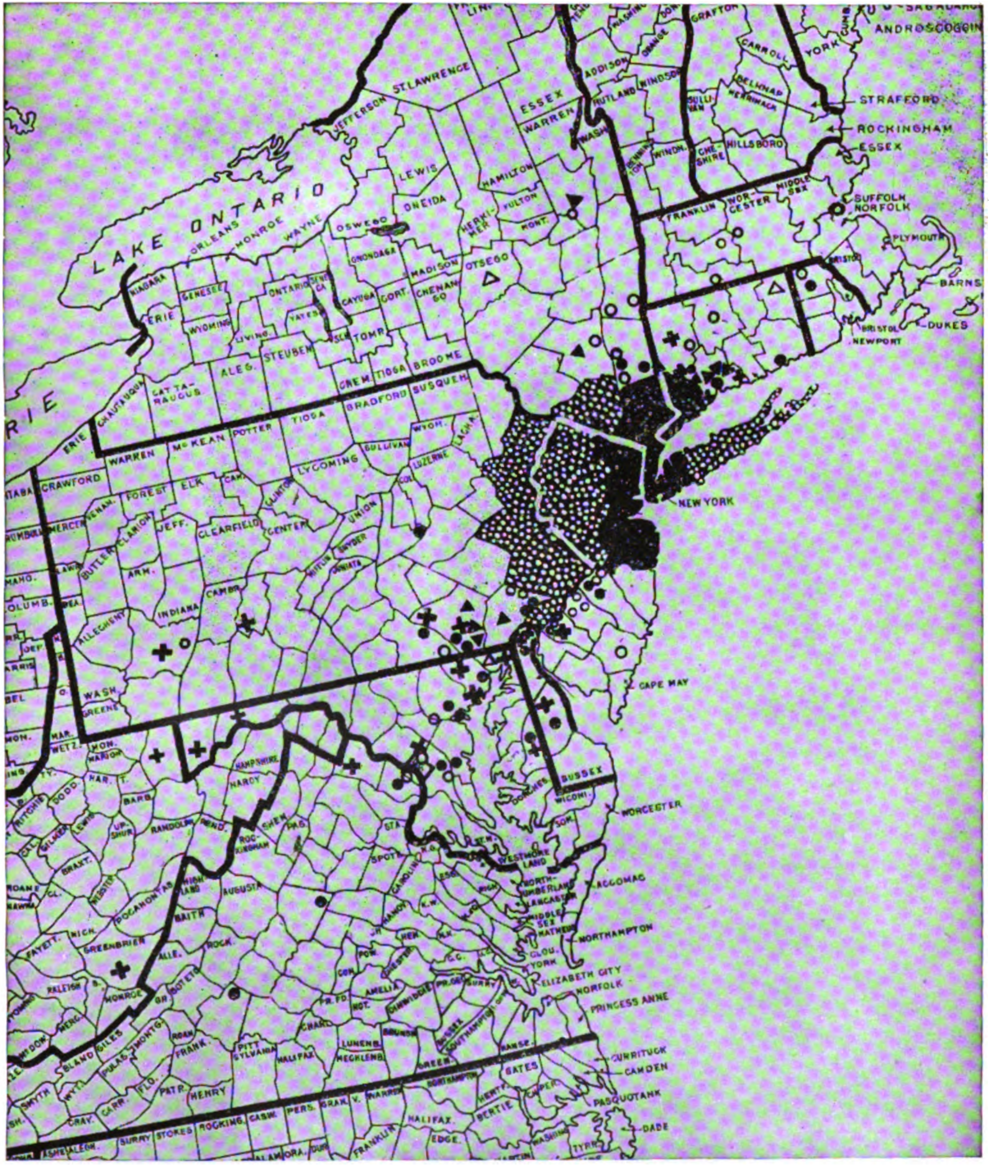
ORNAMENTAL CHESTNUT TREES DYING OF THE BARK DISEASE

Trees of this size are frequently killed in one season. Photos by Haven Metcalf



DEAD CHESTNUT TREES IN FORESTS ON LONG ISLAND

This disease is carried by birds, wind, and insects, and no attacked tree ever recovers. Trees 100 years old may withstand the disease three or four years. Young trees succumb in a single year.



MAP SHOWING DISTRIBUTION OF THE CHESTNUT-BARK DISEASE (*Diaporthe parasitica* Murr.) IN DECEMBER, 1910

It was probably imported with chestnut trees from Japan. First observed in the parks of New York City in 1904, it has since rapidly spread, and now covers much of adjacent territory in lower New York, Connecticut, Long Island, New Jersey, and Pennsylvania, with widely scattered points of infestation. It is estimated that the loss in and about the city of New York is now between 5 and 10 million dollars, and the loss throughout the areas now infested is fully 100 million dollars. There is a prospective loss in Pennsylvania of fully 50 million dollars, and the entire chestnut timber of America seems to be doomed. All this might have been saved with proper quarantine laws.

EXPLANATION OF SYMBOLS

Black area. Complete infection; trees mostly dead. *Spotted area.* General infection. *Black dots.* Infection reported by specimens or observed prior to 1909. *Black crosses.* Infection reported by specimens or observed in 1909. *Black triangles.* Infection reported on reliable authority in 1909. *Circles.* Infection reported by specimens or observed in 1910. *Hollow triangles.* Infection reported on reliable authority in 1910.

some of the more newly opened Canadian provinces, profiting by past experience, have established protective quarantine regulations, which should for a long period give these regions a tremendous advantage over older fruit centers in lessening the cost of production.

It is useless now to dwell on what could have been saved to the agriculture and natural-forest resources of this continent if our forefathers had been wise enough to have early established and intelligently enforced inspection and quarantine regulations against the Old World to exclude plant diseases and insect enemies. That would have been conservation in its most practical form. The past cannot be remedied, but the future can be safeguarded, and that is the present opportunity. The first step towards securing the desired legislation is to arouse a public realization of the need. The moment this need becomes generally felt, the legislation will be forthcoming.